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PUTI SOVERSHENSTVOVANIYA SISTEM VODOSNABZHENIYA LOSOSEVYKH RYBORAZVODNYKH ZAVODOV DAL'NEGO VOSTOKA

WAYS OF IMPROVING THE WATER-SYPPLY SYSTEMS AT THE SALMON-BREEDING STATIONS OF THE FAR EAST

By G.N. Kurganskii (Pacific Scientific Research Institute of Fisheries and Oceanography)

One of the main goals of the special complex program dubbed "Salmon" is the creation in the Far East of large-scale intensive commercial breeding of salmon. The plan calls for more than double the present volume of viable juvenile fish released from the fish-breeding stations. To meet this goal it is necessary to introduce modern biotechnologies of fish hatching and reconstruction of water-supply systems of the existing and newly built fish-rearing stations.

This approach requires that the technological process be planned at each hatchery on the basis of the expected number of spawners coming to the spawning grounds, the most favorable time for the release of juvenile fish, and the expected hydrometeorological situation. At the present time there exist programs for microcomputers permitting any chum salmon-rearing station to plan its activity. Similar programs will be developed in the near future for stations rearing pink, coho, and sockeye salmon. These calculations will allow us to arrive at the most favorable operating conditions with regard to temperature and oxygen, as well as with respect to the run-off for each section and each lot of eggs hatched at the station.

The plan in question forms the basis for a rational choice of water-supply. At present, the salmon-rearing stations of the Far Eastern region

use only one source: underground, ground, and abyssal water. Practically at all the stations the temperature schedule differs from the optimal values. The implementation of the projected parameters of the technological process requires an integrated approach to the utilization of /2
water supply. Mixing ground and underground water in a given ratio to maintain the required temperature schedule is a most effective measure. In some cases, where ground or abyssal water is not present in sufficient quantities, the use of thermal pumps may be indicated. In 1978, the Pacific Scientific Research Institute of Fisheries and Oceanography designed an automated thermal-pump plant which functions selectively under various operating conditions and is used with much success at marine enterprises. Thermal pumps are working quite effectively at salmon-rearing stations in Norway, Sweden, Finland and other countries.

The control over the temperature schedule requires an improved management of the water run-off and a better utilization of oxygen. There are sufficient experimental data on the consumption of oxygen by the salmon at the various stages of their development. It is known that the average energy expenditure for the aeration of water amounts to 1.5-1.7 kwhr per one kilogram of oxygen introduced. It makes sense, therefore, to consider in each individual case bringing down the cost of water and oxygen supply. Taking into account the limited water resources, one has to consider using any economical arrangement, including industrial oxygen.

One way of reducing the expenditure of energy for heating the water is its repeated use. The shortage of water at a number of fish-rearing stations in the Far Eastern region also requires the utilization of return water. Purification installations are very important in this regard, since they determine how much water can be recirculated.

The choice of a rational water supply system that would permit the most economical technological operation calls for a simultaneous analysis of a number of factors. The methodology of such an analysis with the aid of a computer is being developed.